

# CURRICULUM VITAE

## Dr. Ann E. Hornschemeier

Dr. Ann E. Hornschemeier specializes in studies of X-ray emission from X-ray binary populations, both in the local universe and at cosmologically interesting distances ( $z > 0.1$ ). This work is carried out using surveys by space-based X-ray, UV, and infrared observatories as well as ground-based telescopes. She chairs the *NuSTAR* Starburst and Local Group science working group, carrying out observations on seven nearby galaxies, involving coordinated observations with *Chandra*, *XMM-Newton* and Swift, and a team of approximately ten scientists both at NASA GSFC and universities.

Dr. Hornschemeier is the Chief Scientist for the Physics of the Cosmos (PCOS) program, which is the high energy astrophysics and cosmology program at NASA. Dr. Hornschemeier provides science input and advice to the Program Manager and coordinates science activities with the NASA HQ PCOS Program Scientist. She is the interface between the PCOS science community and the program. Dr. Hornschemeier is also heavily involved in future missions as a research scientist at NASA, including serving as science Co-I on the Athena Wide Field Imager (WFI) instrument due for launch in 2028.

### Contact Information

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### Education

#### Ph.D., Astronomy & Astrophysics

**Title:** "CHANDRA X-RAY CONSTRAINTS ON NORMAL AND STARBURST GALAXIES AT COSMOLOGICALLY INTERESTING DISTANCES"

**Degree granted:** May 11, 2002

**Advisor and Institution:** Prof. William N. Brandt, The Pennsylvania State University

#### Master of Science, Astronomy & Astrophysics

**Title:** "NASA SOUNDING ROCKET FLIGHT 36.176UH:  
NON-DISPERSIVE X-RAY SPECTROSCOPY OF SCORPIUS X-1"

**Degree granted:** August 1999

**Advisor and Institution:** Dr. David N. Burrows, The Pennsylvania State University

#### Bachelor of Science, Physics & Mathematics

**Degree granted:** May 1997, Magna Cum Laude

**Institution:** Drake University (Des Moines, Iowa)

### Work Experience

2011 December–Present: Chief Scientist, Physics of the Cosmos (PCOS) program

2007 June–Present: Adjunct Faculty, Johns Hopkins University

2013 September–December: Co-Chair, X-ray Probe Science and Technology Definition Team  
(Invited by NASA HQ Astrophysics Division)

2011 October–2011 December: Study Scientist, PCOS X-ray Mission Architecture Study

2010 Summer–2011 October: Science Exploration Directorate fellowship  
(NASA GSFC sabbatical program)

2004 Fall–2010 Summer: Deputy Project Scientist, IXO, NASA Goddard Space Flight Center  
2004 Fall–2007 June: Visiting Scientist, Johns Hopkins University  
2002 Fall–2004 Fall: X-ray Studies of Normal Galaxies, Chandra Fellowship (JHU)  
1999 Summer–2002 Fall: Analysis of Extragalactic X-ray Background, CDF-N (Penn State)  
1998 Spring–Summer 1999: X-ray Sounding Rocket Program (Prof. David Burrows)

## Recent Awards and Honors

2016 - Elected Fellow of the American Physical Society  
2016 - Helen Sawyer Hogg Prize Lecturer, Canadian Astronomical Society/RASC  
2014 - Penn State Eberly College of Science Outstanding Alumni Award  
2012 - NASA Early Career Achievement Medal  
2010-2011 Science Exploration Directorate Fellowship, NASA GSFC  
2007 - Annie Jump Cannon Prize, American Astronomical Society  
2002–2005 NASA Chandra X-ray Observatory Postdoctoral Fellowship  
1999–2002 NASA Graduate Student Researcher Program (GSRP) Fellowship  
2000–2002 Zaccheus Daniel Foundation for Astronomical Science, scholarship for travel  
1998–2002 NASA Pennsylvania Space Grant Consortium Fellowship

## Membership in Professional Societies

2015-Present: American Physical Society, Division of Gravity  
2013-2014: American Physical Society, Topical Group on Gravitation  
2012-Present: American Physical Society, Division of Astrophysics  
2011-Present: Women in Aerospace  
2009-2012: AAS Committee on the Status of Women in Astronomy  
2009-Present: International Astronomical Union  
2008–2012: Secretary-Treasurer, High Energy Astrophysics Division of the AAS

## Recent Accepted Proposals

2016: Chandra Cycle 18, 187 ks, “Too young to shine? Nearby Primordial Starbursts and the X-ray Scaling Relations in the Early Universe” (Co-I, \$81.4 K, P.I. is Basu-Zych)  
2016: Chandra Cycle 18, 110 ks, “A Close-Up Look at a  $z = 10$  Galaxy Analog: A Deep Chandra Exposure of DDO68” (Co-I., \$54.7 K, P.I. is Lehmer)  
2016: Chandra Cycle 18, 255 ks, “A Statistically Robust Constraint on the Evolution of Field LMXBs”, (Co-I, P.I. is Lehmer)  
2015: Chandra Cycle 17, 25 ks, “0.5–30 keV Monitoring of the M31 Disk with Chandra & NuSTAR” (P.I. \$34K)  
2015: XMM Cycle 14, 42 ks, “A Hard X-ray View of Andromeda: Coordinated XMM-NuSTAR Observations of XRBs” (P.I.)  
2014: NuSTAR Cycle 1, 300 ks, “Long-term monitoring of the M31 disk in hard X-rays” (P.I., \$45.4K)  
2014: NASA ADAP, Co.I. Proposal 14-ADAP14-0200, “The BEST-CG project: missing Baryons, galaxy Evolution and STar formation in Compact Groups”, (\$50K, FY15-FY16)  
2013: Chandra Cycle 15, 75 ks, “0.5-30 keV Imaging of Starbursts with Chandra and NuSTAR”, (P.I., \$50.7K)  
2013: Chandra Cycle 15, Archival Proposal, “Hot Gas and Binary Production in the Earlier Universe: X-Ray Emission from Galaxies in Isolated Compact Groups”, (P.I., \$59.4K)  
2013: Chandra Cycle 15, 3 Ms, “The Chandra Deep Field-South: A Peerless Ultradeep Survey for Exploring the Distant X-ray Universe”, (Co.I., institutional budget P.I. \$60.7K)  
2011: Chandra Cycle 13, 60 ks, “Broad-band (0.5-30 keV) X-ray imaging of starburst galaxies with Chandra and NuSTAR”, (P.I., \$42K)

2011: Chandra Cycle 13, 93 ks, “Direct Chandra Constraints on the Evolution of Field LMXB Populations” (Co.I.,\$42K)

2011: Swift Cycle 7, “The Evolution of Star Formation in Compact Groups,” (Co.I., budget P.I.)

2011 & 2010: NASA Center for Computational Sciences, 700000 & 300000 processor-hours on Linux cluster “Discover”, “X-ray Binary Formation and Evolution on Cosmological Timescales (P.I.)

2010: Chandra Cycle 12, 67 ks, Chandra Observations of Local Lyman Break Galaxy Analogs including NRAO EVLA time (Co.I., budget P.I., \$56K)

2010: Swift Cycle 6, 34 ks UVOT fill-in program, ‘Using Swift UVOT to Investigate Triggered Star Formation in Close Pairs, (Co.I., budget P.I., \$20K, Proposal 6090808)

2009: “Accreting Binary Populations from Billions of Years Ago to the Year 2035”, NASA ADP (P.I., Proposal 09-ADP09-0071, \$686K, FY10-FY14)

2009: GALEX Cycle 5, 30 ks, “A Laboratory for Galaxy Evolution: Deep Imaging of the Coma Cluster Core,” (Co.I., budget P.I., \$35K)

2009&2008: NOAO, Cerro Tololo 4-m Blanco Telescope, Hydra instrument, 2 nights in 2009A (co.I.) & 6 nights in 2008B (P.I.), ‘Groups around Groups: Multi-Object Spectroscopy of Hickson Compact Groups’

2008: Chandra ACIS, 770 ks Large Project, “Galaxies across the Octaves: A Chandra Legacy Survey of SINGS Galaxies” (Co.I, budget P.I., \$234K FY08)

2008: Chandra ACIS, Groups (Co.I, budget P.I., \$29K FY08)

2007: NOAO, Multiple Mirror Telescope, Hectospec instrument, 4 nights (Co. I.), ‘The Faint End of the Red Sequence in the Coma Cluster: A Comprehensive Spectroscopic Survey from the Core to the Virial Radius’ 2007: NOAO, Multiple Mirror Telescope, Hectospec instrument, 4 nights, (P.I.), ‘Expanding the Spectroscopic Completeness of the Coma Cluster with Hectospec’

2007: “Star Formation and Stellar Mass Estimates of Hickson Compact Group galaxies with Ultraviolet , X-ray and NIR Data”, NASA ADP (Proposal 06-ADP06-27, P.I.,\$323K)

2006: Hubble Space Telescope, 164 orbits, Program 10861, “An ACS Treasury Survey of the Coma cluster of galaxies” (Co.I., \$70K FY07, \$70K FY08)

2006: Hubble Space Telescope, 60 orbits, Program 10787, “Modes of Star Formation and Nuclear Activity in an Early Universe Laboratory” (Co.I., budget in process)

2006: XMM-Newton, 220 ks (priority A&B), Program 040315, “Complete X-ray Observations of an Off-Center Region in Coma” (P.I., \$140K )

2006: XMM-Newton, 98 ks (priority A), 20 ks(priority C), Program 040376, “X-ray Observations of Local Lyman Break Galaxies” (P.I., \$60K)

2005: GALEX, 30 ks, Program 05-GALEX05-46, “Constraining low-level star formation activity: A Deep GALEX survey at the outskirts of the Coma Cluster in Coma (P.I.,\$47K + 0.2 FTEs)

2004: Chandra archival, Proposal ID 06620842, ”X-ray Probes of Star-Formation Using Two Rich Archives: the Combined Power of Chandra and the SDSS” (P.I.,\$55K)

2004: Spitzer IRAC, Program 3521, 6.9 hours with IRAC in Coma (P.I., \$29K)

2004: Spitzer IRAC/IRS, Program 3360, 20 hours in NGC 4389 (Co.I.,\$10K)

2004: Spitzer IRAC, Program 3596, 20 hours with IRAC/MIPS on Hickson Compact Groups (Co.I,\$19.7K)

2003: Chandra ACIS, 65 kiloseconds on Coma cluster field (P.I., \$39K)

2003: Chandra ACIS, 1 million seconds on E-CDF-S field (Co-Investigator)

## Observational Experience

From 2000-2007, Ann Hornschemeier obtained experience at ground-based observing facilities in more than half a dozen observing runs including on the Irene du Pont 2.5 m telescope in Las Campanas, Chile, MMT Hectospec on Mount Hopkins in Arizona and the James Clerk Maxwell Telescope on Mauna Kea, HI.

## Editorial/Reviewing Experience

I have been asked by the Astrophysical Journal Letters, the Astrophysical Journal, the Astronomical Journal and by the Monthly Notices of the Royal Astronomical Society to review papers.

### Telescope Time Review Service:

- Spitzer Review, April 2005
- HST Review, March 2006, June 2014
- NASA Proposal Review, Fall 2007
- NASA ADP Write-in Review, Fall 2008
- Spitzer Review, March 2009
- ADAP Review, August 2010
- Chandra Review, (June 2004, June 2009, June 2011)

### Scientific Organizing Committees for Conferences:

- “Galaxies Viewed with Chandra Workshop”, Cambridge, MA, July 2004
- “Six Years of Science with Chandra”, Boston, MA, November 2005
- “Extragalactic Surveys: A Chandra Science Workshop”, November 2006
- “Eight Years of Science with Chandra”, Huntsville, AL October 2007
- “Tenth Meeting of the High Energy Astrophysics Division of the AAS”, Los Angeles, CA, March/April 2008
- (“Women in Astronomy and Space Science 2009: Meeting the Challenges of an Increasingly Diverse Workforce”, College Park, MD, October 2009)
- “Eleventh Meeting of the High Energy Astrophysics Division of the AAS”, Waikaloa, Hawaii, March 2010
- “Twelve Years of Chandra”, Boston, MA, May 2011
- “Twelfth Meeting of the High Energy Astrophysics Division of the AAS”, Newport, RI, September 2011
- “The Deepest View of the X-ray Universe: 4 Ms Chandra Deep Field Results”, Day Long Meeting-in-a-Meeting at the AAS, Anchorage, AK, June 2012 (chair of SOC)
- “Calibration of Star Formation Rates Across the Electromagnetic Spectrum; Special Session of the IAU General Assembly”, Beijing, China, August 2012 (co-chair of SOC)
- Invited to participate in two SOCs for conferences cancelled by the 2013 sequester, “Multi-messenger Time Domain Astronomy” in Maryland and a *Chandra* X-ray Center workshop on X-ray emission from galaxies
- “X-ray view of Galaxy Ecosystems”, *Chandra* X-ray Center workshop, Cambridge, MA, July 9-11, 2014
- “COSPAR-14-E1.4: X-Ray Spectroscopy of Large-scale Plasmas”, COSPAR Moscow, Russia, August 2-10, 2014
- “15 Years of *Chandra* Science”, Cambridge, MA, November 18-21, 2014
- “Feedback from accreting binaries in cosmological scales”, Special Session Organizer with Ptak & Zezas for HEAD meeting, Naples, FL, April 2016
- “X-ray Universe 2017”, Rome, Italy, June 2017

# Principal Publications & Presentations

*Dr. Hornschemeier has > 100 refereed publications and > 8000 refereed citations (May 2017)*

## First, Second and Third Author Refereed Publications

- ‘Identification of the Hard X-Ray Source Dominating the E  $\gamma$  25 keV Emission of the Nearby Galaxy M31’, Yukita, M., Ptak, A., **Hornschemeier, A. E.**, Wik, D., Maccarone, T. J., Pottschmidt, K., Zezas, A., Antoniou, V., Ballhausen, R., Lehmer, B. D., Lien, A., Williams, B., Baganoff, F., Boyd, P. T., Enoto, T., Kennea, J., Page, K. L., Choi, Y., 2017, ApJ, 838, 47
- ‘A Hard X-ray Study of the Normal Star-Forming Galaxy M83 with NuSTAR’, Yukita, M., **Hornschemeier, A.E.**, Lehmer, B.D., Ptak, A., Wik, D.R., Zezas, A., Antoniou, V., Maccarone, T.J., Replicon, V., Tyler, J.B., Venters, T., Argo, M.K., Bechtol, K., Boggs, S., Christensen, F.E., Craig, W. W., Hailey, C., Harrison, F., Krivonos, R., Kuntz, K., Stern, D., Zhang, W.W., ApJ, 2016, 824, 2
- ‘Demonstrating the likely neutron star nature of five M31 globular cluster sources with Swift-NuSTAR spectroscopy’, Maccarone, T.J., Yukita, M., **Hornschemeier, A.**, Lehmer, B.D., Antoniou, V., Ptak, A., Wik, D.R., Zezas, A., Boyd, P., Kennea, J., Page, K. L., Eracleous, M., Williams, B.F.; Boggs, S.E., Christensen, F. E., Craig, W.W., Hailey, C.J., Harrison, F.A.; Stern, D.; Zhang, W.W., 2016, MNRAS, 458, 3633
- ‘Exploring X-Ray Binary Populations in Compact Group Galaxies with Chandra’, Tzanavaris, P., **Hornschemeier, A.E.**, Gallagher, S. C., Lenki, L., Desjardins, T. D., Walker, L. M., Johnson, K. E., Mulchaey, J. S., 2016, ApJ, 817, 95
- ‘The 0.3-30 keV Spectra of Powerful Starburst Galaxies: NuSTAR and Chandra Observations of NGC 3256 and NGC 3310’, Lehmer, B. D., Tyler, J. B., **Hornschemeier, A. E.**, Wik, D. R., Yukita, M., Antoniou, V., Boggs, S., Christensen, F. E., Craig, W. W., Hailey, C. J., Harrison, F. A., Maccarone, T. J., Ptak, A., Stern, D., Zezas, A., Zhang, W. W., 2015, ApJ, 806, 126
- ‘A Focused, Hard X-ray Look at Arp 299 with NuSTAR’, Ptak, A., **Hornschemeier, A.**, Zezas, A., Lehmer, B., Yukita, M., Wik, D., Antoniou, V., Argo, M.K., Ballo, L., Bechtol, K., Boggs, S., Della Ceca, R., Christensen, F., Craig, W., Hailey, C., Harrison, F., Krivonos, R., Maccarone, T., Stern, D., Tatum, M., Venters, T., 2015, ApJ, 800, 104
- ‘Spatially Resolving a Starburst Galaxy at Hard X-ray Energies: NuSTAR, Chandra and VLBA Observations of NGC 253, Wik, D., Lehmer, B., **Hornschemeier, A.**, Yukita, M., Ptak, A., Zezas, A., Antoniou, V., Argo, M.K., Bechtol, K., Boggs, S., Christensen, F., Craig, W., Hailey, C., Harrison, F., Krivanos, R., Maccarone, T.J., Stern, D., Venters, T., Zhang, W., 2014, ApJ, 797, 79
- ‘Some Like It Hot: Linking Diffuse X-ray Luminosity, Baryonic Mass, and Star Formation Rate in Compact Groups of Galaxies’, Desjardins, Tyler D., Gallagher, Sarah C., **Hornschemeier, Ann E.**, Mulchaey, John S., Walker, Lisa May, Brandt, William N., Charlton, Jane C., Johnson, Kelsey E., Tzanavaris, Panayiotis 2014, ApJ, 790, 132
- ‘Chandra-Swift View of Point Sources in Hickson Compact Groups: High AGN Fraction but a Dearth of Strong AGNs’, Tzanavaris, P., Gallagher, S. C., **Hornschemeier, A. E.**, Fedotov, K., Eracleous, M., Brandt, W. N., Desjardins, T. D., Charlton, J. C., Gronwall, C., 2014, ApJS, 212, 9
- ‘Evidence for Elevated X-Ray Emission in Local Lyman Break Galaxy Analogs’, Basu-Zych, Antara R., Lehmer, Bret D., **Hornschemeier, Ann E.**, Goncalves, Thiago S., Fragos, Tassos,

Heckman, Timothy M., Overzier, Roderik A., Ptak, Andrew F., Schiminovich, David, 2013, ApJ, 774, 152

- ‘NuSTAR and Chandra Insight into the Nature of the 3-40 keV Nuclear Emission in NGC 253’, Lehmer, B. D., Wik, D. R., **Hornschemeier, A. E.**, Ptak, A. et al., ApJ, 2013, 771, 134
- ‘The X-Ray Star Formation Story as Told by Lyman Break Galaxies in the 4 Ms CDF-S’, Basu-Zych, Antara R., Lehmer, Bret D., **Hornschemeier, Ann E.** et al., 2013, ApJ, 762, 45
- ‘A Deep GALEX luminosity function in an off-center region of the Coma Cluster’, Hammer, D. M., **Hornschemeier, A.E.**, Salim, S., Jenkins, L.P., Miller, N., Mobasher, B., Ferguson, H., Heckman, T., ApJ, 2012, 745, 177
- ‘A Search for Lyman Break Galaxies in the Chandra Deep Field South Using Swift Ultraviolet/Optical Telescope’, Basu-Zych, A.R., **Hornschemeier, A. E.**, Hoversten, E. A., Lehmer, Bret, Gronwall, Caryl, ApJ, 2012, 739, 298
- ‘UV+IR Star Formation Rates: Hickson Compact Groups with Swift and Spitzer’, Tzanavaris, P., **Hornschemeier, A.E.**, Gallagher, S.C., Johnson, K.E., Gronwall, C., Immler, S., Reines, A.E., Hoverstein, E., Charlton, J., ApJ, 2010, 716, 556
- ‘Deep GALEX Observations of the Coma Cluster: Source Catalog and Galaxy Counts’, Hammer, D. M., Hornschemeier, A.E., Mobasher, B., Miller, N., Smith, R., Arnouts, S., Milliard, B. and Jenkins, L., ApJS, 2010, 190, 1
- ‘A Deep VLA Radio Continuum Survey of the Core and Outskirts of the Coma Cluster’, Miller, N.A., **Hornschemeier, A. E.**, Mobasher, B., AJ, 2009, 137, 4436
- ‘The Radio Luminosity Function and Galaxy Evolution in the Coma Cluster’, Miller, N. A., **Hornschemeier, A. E.**, Mobasher, B., Bridges, T. J., Hudson, M. J., Marzke, R. O., Smith, R. J., AJ, 2009, 137, 4450
- ‘Uncovering the Near-Infrared Dwarf Galaxy Population of the Coma Cluster with Spitzer IRAC,’ Jenkins, L. P., **Hornschemeier, A. E.**, Mobasher, B., Alexander, D. M., Bauer, F. E., ApJ, 2007, 666, 846
- ‘Constraints on accretion in Ultraluminous X-ray Sources from Spitzer IRS observations of NGC 4485/90: Infrared diagnostic diagram’ Vazquez, G. A., **Hornschemeier, A. E.**, Colbert, E., Roberts, T. P., Ward, M. J.; Malhotra, S., ApJL, 2007, 658, L21
- ‘Chandra X-ray Observations of Galaxies in an Off-Center Region of the Coma Cluster’ **Hornschemeier, A. E.**, Mobasher, B., Alexander, D. M., Bauer, F. E., Bautz, M. W., Hammer, D., Poggianti, B. M, ApJ, 2006, 643, 144
- ‘Chandra-SDSS Normal and Star-Forming Galaxies. I. X-Ray Source Properties of Galaxies Detected by the Chandra X-Ray Observatory in SDSS DR2’, **Hornschemeier, A. E.**, Heckman, T. M., Ptak, A. F., Tremonti, C. A., Colbert, E. J. M., AJ, 2005, 129, 86
- ‘The Chandra Deep Field-North Survey: XVII. Evolution of magnetic activity in old late-type stars’, Feigelson, E. D., **Hornschemeier, A. E.**, Micela, G., Bauer, F. E., Alexander, D. M., Brandt, W. N., Favata, F., Sciortino, S., Garmire, G. P., ApJ, 2004, 611, 1107
- ‘Lower Mass Black Holes in the GOODS? Off-nuclear X-ray Sources’, **Hornschemeier, A.E.**, Alexander, D.M., Bauer, F.E., Brandt, W.N., Chary, R., Conselice, C., Grogin, N., Koekoemoer, A.M., Mobasher, B., Paolillo, M., Ravindranath, E.J. Schreier, ApJL, 2004, 600, 147
- ‘The Chandra Deep Field North Survey. XV. Optically Bright, X-Ray-Faint Sources’, **Hornschemeier A.E.**, Bauer F.E., Alexander D.M., Brandt W.N., Sargent W. L.W., Bautz M.W., Conselice C., Garmire G.P., Schneider D.P. & Wilson G., AJ, 126, 575

- ‘The weak outnumbering the mighty: normal galaxies in deep Chandra surveys.’, **Hornschemeier, A.E.**, Bauer, F.E., Alexander, D.M., Brandt, W.N., Sargent, W.L.W., Vignali, C., Garmire, G.P., & Schneider, D.P., 2003, *Astronomische Nachrichten*, 324, 12
- ‘The Chandra Deep Field North Survey VIII. X-ray constraints on galaxies from  $0.4 < z < 1.5$ ’, **Hornschemeier A.E.**, Brandt W.N., Alexander D.M., Bauer F.E., Garmire G.P., Schneider D.P., Bautz M.W., Chartas G., 2001, *The Astrophysical Journal*, 568, 82
- ‘The Chandra Deep Field North survey. VII. X-ray emission from Lyman break galaxies’, Brandt W.N., **Hornschemeier A.E.**, Schneider D.P., Alexander D.M., Bauer F.E., Garmire G.P., Vignali C., 2001, *The Astrophysical Journal*, 558, L5–L9
- ‘The Chandra deep survey of the Hubble Deep Field North area. IV. An ultra-deep image of the Hubble Deep Field North’, Brandt W.N., **Hornschemeier A.E.**, Alexander D.M., Garmire G.P., Schneider D.P., Broos P.S., Townsley L.K., Bautz M.W., Feigelson E.D., Griffiths R.E., 2001, *AJ*, 122, 1–20
- ‘The Chandra deep survey of the Hubble Deep Field North area. II. Results from the Caltech Faint Field Galaxy Redshift Survey area’, **Hornschemeier A.E.**, Brandt W.N., Garmire G.P., Schneider D.P., Barger A.J., Broos P.S., Cowie L.L., Townsley L.K., Bautz M.W., Burrows D.N., Chartas G., Feigelson E.D., Griffiths R.E., Lumb D., Nousek J.A., Ramsey L.W., Sargent W.L.W., 2001, *ApJ*, 554, 742–777
- ‘X-ray sources in the Hubble Deep Field detected by Chandra’, **Hornschemeier A.E.**, Brandt W.N., Garmire G.P., Schneider D.P., Broos P.S., Townsley L.K., Bautz M.W., Burrows D.N., Chartas G., Feigelson E.D., Griffiths R.E., Lumb D., Nousek J.A., Sargent W.L.W., 2000, *ApJ*, 541, 49–53
- ‘Observations of faint, hard-band X-ray sources in the field of CRSS J0030.5+2618 with the Chandra X-ray Observatory and the Hobby-Eberly Telescope’, Brandt W.N., **Hornschemeier A.E.**, Schneider D.P., Garmire G.P., Chartas G., Hill G.J., MacQueen P.J., Townsley L.K., Burrows D.N., Koch T.S., Nousek J.A., Ramsey L.W., 2000, *AJ*, 119, 2349–2359

### Other Refereed Publications

- ‘Testing the Universality of the Stellar IMF with Chandra and HST’, Coulter, D. A., Lehmer, B. D., Eufrasio, R. T., Kundu, A., Maccarone, T., Peacock, M., **Hornschemeier, A. E.**, Basu-Zych, A., Gonzalez, A. H., Maraston, C., Zepf, S. E., 2017, *ApJ*, 183, 7 (mid-level contributor)
- ‘The Chandra Deep Field-South Survey: 7 Ms Source Catalogs’, Luo, B., Brandt, W. N., Xue, Y. Q., Lehmer, B., Alexander, D. M., Bauer, F. E., Vito, F., Yang, G., Basu-Zych, A. R., Comastri, A., Gilli, R., Gu, Q.-S., **Hornschemeier, A. E.**, Koekemoer, A., Liu, T., Mainieri, V., Paolillo, M., Ranalli, P., Rosati, P., Schneider, D. P., Shemmer, O., Smail, I., Sun, M., Tozzi, P., Vignali, C., Wang, J.-X., 2016, *ApJ*, 228, 2 (contributor)
- ‘The quiescent intracluster medium in the core of the Perseus cluster’, Hitomi collaboration, 2016, *Nature*, 535, 7610
- ‘The Evolution of Normal Galaxy X-ray Emission Through Cosmic History: Constraints from the 6 Ms Chandra Deep Field-South’, Lehmer, B.D., Basu-Zych, A.R., Mineo, S., Brandt, W.N., Eufrasio, R.T., Fragos, T., Hornschemeier, A.E., Luo, B., Xue, Y.Q., Bauer, F.E., Gilfanov, M., Ranalli, P., Schneider, D.P., Shemmer, O., Tozzi, P., Trump, J.R., Vignali, C., Wang, J.X., Yukita, M., Zezas, A., *ApJ*, 2016, 825,7 (mid-level contributor)

- ‘The Ultraviolet and Infrared Star Formation Rates of Compact Group Galaxies: An Expanded Sample’, Lenki, L., Tzanavaris, P., Gallagher, S., Desjardins, T., Walker, L. M., Johnson, K., Fedotov, K., Charlton, J., **Hornschemeier, A.**, Durrell, P., Gronwall, C., 2016, MNRAS, 459, 3 (contributor)
- ‘Exploring the Overabundance of ULXs in Metal- and Dust-poor Local Lyman Break Analogs’, Basu-Zych, A.R., Lehmer, B., Fragos, T., **Hornschemeier, A.**, Yukita, M., Zezas, A., Ptak, A., 2016, ApJ, 818, 140 (mid-level contributor)
- ‘Spectral and Temporal Properties of the Ultraluminous X-Ray Pulsar in M82 from 15 years of Chandra Observations and Analysis of the Pulsed Emission Using NuSTAR’, Brightman, M., Harrison, F., Walton, D.J., Fuerst, F., **Hornschemeier, A.**, Zezas, A., Bachetti, M., Grefenstette, B., Ptak, A., Tendulkar, S., Yukita, M., 2016, ApJ, 816, 60 (mid-level contributor)
- ‘An ultraluminous X-ray source powered by an accreting neutron star’, Bachetti, M., Harrison, F. A., Walton, D. J., Grefenstette, B. W., Chakrabarty, D., Fürst, F., Barret, D., Beloborodov, A., Boggs, S. E., Christensen, F. E., Craig, W. W., Fabian, A. C., Hailey, C. J., **Hornschemeier, A.**, Kaspi, V., Kulkarni, S. R., Maccarone, T., Miller, J. M., Rana, V., Stern, D., Tendulkar, S. P., Tomsick, J., Webb, N. A., Zhang, W. W., 2015, *Nature*, 514, 202 (contributor)
- ‘The X-ray Luminosity Functions of Field Low Mass X-ray Binaries in Early-Type Galaxies: Evidence for a Stellar Age Dependence’, Lehmer, B. D., Berkeley, M., Zezas, A., Alexander, D. M., Basu-Zych, A., Bauer, F. E., Brandt, W. N., Fragos, T., **Hornschemeier, A. E.**, Kalogera, V., Ptak, A., Sivakoff, G. R., Tzanavaris, P., Yukita, M. 2014, ApJ, 789, 52 (mid-level contributor)
- ‘A new candidate Wolf-Rayet X-ray binary in NGC 253’, Maccarone, T. J., Lehmer, B. D., Leyder, J. C., Antoniou, V., **Hornschemeier, A.**, Ptak, A., Wik, D., Zezas, A., 2014, MNRAS, 439, 3064 (mid-level contributor)
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  - ‘Supermassive black hole accretion history inferred from a large sample of hard X-ray sources’, Barger A.J., Cowie L.L., Bautz M.W., Brandt W.N., Garmire G.P., **Hornschemeier A.E.**, Ivison R.J., Owen F.N., 2001, ApJ, 568,L23–L28 (contributor)
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- ‘Submillimeter Properties of the 1 Ms Chandra Deep Field North X-ray Sample’, Barger A.J., Cowie L.L., Steffen A.T., **Hornschemeier A.E.**, Brandt W.N., Garmire G.P., 2001, ApJ, 560, L23–L28

### Technical Publications/Proceedings

- ‘What dominates the X-ray emission of normal galaxies?’, **Hornschemeier, A.E.**, Wolter, A., Kim, D.-W., Proceedings of *Astronomy in Focus*, XXIXB, Focus Meeting 6, XXIXth IAU General Assembly, Aug 2015, Piero Benvenuti, editor, published summer 2016
- ‘Calibration of Star-Formation Rate Measurements Across the Electromagnetic Spectrum’, Buat, V. , Braine, J. , Dale, D. A. , **Hornschemeier, A.** , Lehmer, B. , Kroupa, P. , Pflamm-Altenburg, J. , Popescu, C. C. , Wu, H. , Zezas, A., *Highlights of Astronomy*, Vol. 16, Proceedings from the XXVIIIth IAU General Assembly (August 2012), March 2015
- “The NuSTAR ULX program”, Bachetti, M. et al., Physics at the Magnetospheric Boundary, Geneva, Switzerland, Edited by E. Bozzo, P. Kretschmar; M. Audard; M. Falanga; C. Ferrigno; 2014
- “The ASTRO-H X-ray Observatory”, Takahashi, T. et al., Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 2012, 8443 (arXiv:1210:4378)
- “Science metrics for a NASA large optic x-ray microcalorimeter mission”, Smith, R. K. , Bookbinder, J. , Garcia, M. , **Hornschemeier, A.** , Petre, R. , Ptak, A., Society of Photo-Optical Instrumentation Engineers (SPIE ) Conference Series, 2012, 8443
- “The Advanced X-ray Spectroscopic Imaging Observatory (AXSIO)”, Bookbinder, J. A. , Smith, R. K. , Bandler, S. , Garcia, M. , **Hornschemeier, A.** , Petre, R. , Ptak, A. , Society of Photo-Optical Instrumentation Engineers (SPIE ) Conference Series, 2012, 8443
- ‘Accreting Binary Populations and ISM Evolution in Galaxies’, Zezas, A., **Hornschemeier, A.**, Fabbiano, G., Brissenden, R., Elvis, M., Gallagher, J., Jenkins, J., Kalogera, K., Lehmer, B., Ptak, A., Strickland, D., Ward, M., 2009, IXO Astro2010 White Paper, [http://www7.nationalacademies.org/bpa/Astro2010\\_SWP\\_byTitle.html](http://www7.nationalacademies.org/bpa/Astro2010_SWP_byTitle.html)
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- ‘Starburst Galaxies: Outflows of Metals and Energy into the IGM’, Strickland D. K., **Hornschemeier A.**, Ptak A., Schlegel E., Tremonti C., Tsuru T., Tuellmann R., Zezas A., IXO Astro2010 White Paper, 2009, arXiv:0902.2945
- ‘Science with Generation-X’, Wolk S. J., et al., 2008, SPIE, 7011,
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- ‘The status of the Constellation-X mission’, Petre R., White N. E., Tananbaum H., **Hornschemeier A.**, Bookbinder J., Garcia M., Grady J., Kilbourne C., 2007, SPIE, 6686,
- ‘The X-Ray Observatory Suzaku’, Mitsuda K., et al., 2007, PASJ, 59, 1
- ‘The Frontier in X-ray Spectroscopy: NASA’s Constellation-X Mission’, **Hornschemeier A. E.**, White N. E., Tananbaum H., 2005, AIPC, 774, 383

### Selected Presentations, Oral and Poster

- ‘The High Energy X-ray Probe’, talk given on behalf of Fiona Harrison, American Physical Society meeting, Washington, D.C., January 29, 2017
- ‘ESA/NASA L3 Study and Gravitational Wave Science at NASA’, presented on behalf of Ira Thorpe, L3Study Scientist, Physics of the Cosmos Program Analysis Group (PhysPAG) Meeting, January 3, 2017
- ‘Nearby galaxies with the High Energy X-ray Probe (HEX-P)’, *NuSTAR* Science Meeting, November 14, 2016
- ‘The Survey and Time-Domain Astrophysical Research Explorer (STAR-X)’, GSFC-JHU Interaction Day, NASA GSFC, October 17, 2016
- ‘All the X-ray binaries in the Universe: X-ray Emission from Normal and Starburst Galaxies Near and Far’, Helen Sawyer Hogg Lecture, Royal Astronomical Society meeting, London, Ontario, May 21, 2016
- ‘All the X-ray binaries in the Universe: X-ray Emission from Normal and Starburst Galaxies Near and Far’, colloquium at University of Western Ontario, London, Ontario, May 20, 2016
- ‘All the X-ray binaries in the Universe: X-ray Emission from Normal and Starburst Galaxies Near and Far’, colloquium at McGill University, Montreal, March 29, 2016
- ‘X-ray binary populations from 0.5-30 keV with NuSTAR and Chandra’, Colloquium at Texas Tech University, November 19, 2015
- ‘X-ray Emission from Star Formation at Earlier Times in the Universe’, X-ray Vision Workshop for X-ray Surveyor, Museum of the American Indian, Washington, D.C., October 2015
- ‘Extragalactic X-ray binaries from 0.5-30 keV with Chandra and NuSTAR’, NASA GSFC Astrophysics Colloquium, June 2015
- ‘Extragalactic X-ray binaries from 0.5-30 keV with Chandra and NuSTAR’, Invited talk at the 15 Years of Chandra meeting, Boston, MA, Nov 18-21, 2014
- ‘A Hard X-ray View of Starburst Galaxies with NuSTAR’, Contributed talk at the AAS meeting, Washington, D.C., January 6-10, 2014
- ‘High Energy Astrophysics and Cosmology from Space’, Invited talk, American Physical Society meeting, Savannah, GA, April 6, 2014
- ‘Hard X-ray emission from Starburst Galaxies with the NuSTAR Mission’, Contributed talk at the American Physical Society meeting, Denver, CO, April 13, 2013
- ‘Getting a Good, Hard X-ray Look at Starburst Galaxies with NuSTAR’, invited special talk at the AAS HEAD meeting, Monterey, CA, April 8, 2013
- ‘X-ray Emission from Galaxies Across Cosmic Time’, invited colloquium, University of Western Ontario, London, ON, March 1, 2013
- ‘X-ray Emission from Galaxies Across Cosmic Time’, invited colloquium, Towson University, Baltimore, MD, February 22, 2013

- ‘X-ray Emission from Galaxies Across Cosmic Time’, invited colloquium, Dartmouth College, Hanover, NH, February 1, 2013
- ‘Stellar-mass compact object evolution from the deepest X-ray surveys of the extragalactic Universe’, contributed oral presentation at the American Physical Society meeting, Atlanta, GA, April 1, 2012
- ‘Accreting binary populations from billions of years ago to today’, NASA MSFC, Huntsville, AL, invited colloquium, March 30, 2012
- ‘X-ray Binary Populations in a Cosmological Context, Including NuSTAR Predictions’, presentation at High Energy Views of Galaxies and their Nuclei: The 60th birthdays of Martin Elvis & Giuseppina Fabbiano, Tulum, Mexico, 6-11 November, 2011
- ‘Accreting Binary Populations from Billions of Years Ago to Today,’ University of Illinois, Urbana-Champaign, invited astrophysics colloquium, April 12, 2011
- ‘Accreting binary populations in the earlier Universe’, contributed presentation at High Energy View of Accreting Objects: AGN and X-ray Binaries, Agios Nikolaos, Crete, Greece, 5 - 14 October 2010
- ‘X-rays from galaxies teeming with black holes and neutron stars’, invited talk, American Association of Physics Teachers meeting, Washington, D.C., February 17, 2010
- ‘The International X-ray Observatory’, invited talk, AIAA Space 2009 Conference in session ‘Space Science: Into the Future’, Jonas Zmuidzinas (chair), Pasadena, CA, September 15, 2009
- ‘X-ray Astrophysics: Chandra, XMM-Newton, Suzaku, Astro-H’, invited talk, AIAA Space 2009 Conference in session ‘NASA’s Astrophysics Program and the International Year of Astronomy’, Jon Morse (chair), Pasadena, CA, September 16, 2009
- ‘X-ray scaling relations for galaxies: hen and how do they break?’, invited talk for University of Maryland - NASA GSFC Interaction Day, May 1, 2009
- ‘The International X-ray Observatory’, invited colloquium, Steward Observatory, Tucson, AZ, April 16, 2009
- ‘Starburst Galaxies: Outflow of metals into the IGM’, contributed talk, International X-ray Observatory meeting, Boston, Massachusetts, January 28, 2009
- ‘X-ray Emission from Galaxies at High Redshift’, International X-ray Observatory meeting, Garching, Germany, September 18, 2008
- ‘Accreting Binaries Billions of Light Years Away: X-ray Emission from Distant Galaxies’, invited department colloquium, McGill University, Montreal, Quebec, September 9, 2008
- ‘Galaxies in the X-ray Band’, invited lecture at Putting Gravity to Work conference, Cambridge, UK, July 21-25 2008
- ‘X-ray Emission from Galaxies Outside the Local Universe’, invited astrophysics colloquium, Jet Propulsion Laboratory, Pasadena, CA, June 2008
- ‘Tracing the Energetics of the Universe with Constellation-X: Example Scientific Investigations’, 4th UC Irvine Center for Cosmology Conference, Irvine, CA, April 17, 2008
- ‘X-ray emission from Ultraviolet-Luminous Galaxies and Lyman Break Galaxies’, AAS High Energy Astrophysics Division meeting, Los Angeles, CA April 3, 2008
- ‘X-ray Emission from UVLGs and ULXs’, invited oral contribution for A Population Explosion: The Nature and Evolution of X-ray Binaries in Diverse Environments, Saint Petersburg, FL, October 31, 2007

- ‘Comparing X-ray emission from Ultraviolet-Luminous Galaxies and Lyman Break Galaxies’, contributed talk, Eight Years of Science with Chandra, Huntsville, AL, October 23, 2007
- ‘Constellation-X’, short oral contribution to Astrophysics in the Next Decade: JWST and Concurrent Facilities, Tucson, AZ, September 25-27, 2007
- ‘X-ray Emission from Galaxies Outside the Local Universe’, invited keynote lecture for the XXXIII Reunião Anual de Sociedade Astronômica Brasileira, Passo Quatro, MG, Brazil, September 2–6, 2007
- ‘The Constellation X-ray Mission’, invited oral contribution to 40 Years of X-ray Astronomy conference in honor of Gordon Garmire, State College, PA, June 14-15, 2007
- ‘X-ray Emission from Galaxies Outside the Local Universe’, prize lecture to the American Astronomical Society meeting in Honolulu, HI, 1200 attendees, May 2007
- ‘New Views of the Coma Cluster: Local Multiwavelength Micro-Cosmos’, invited department colloquium, Ohio State University, January, 2007
- ‘Constellation-X Science Objectives’, BEPAC Meeting, Newport Beach, CA, January 2007
- ‘The Constellation-X Science Case’, AAS HEAD Meeting, San Francisco, CA, October 2006
- ‘Future X-ray Observatories’, invited talk at the Making the Most of the Great Observatories workshop in Pasadena, CA, May 2006
- ‘X-ray Emission from Normal and Starburst Galaxies Outside the Local Universe’, invited department colloquium, University of Wyoming, May 9, 2006
- ‘Unraveling the Secrets of the Cosmic X-Ray Background’, invited department colloquium, University of Iowa, April 24, 2006
- ‘Normal and Starburst Galaxies in Deep X-ray Surveys’, invited department colloquium, Ohio University, September 16, 2005
- ‘Normal and Starburst Galaxies in Deep X-ray Surveys’, invited department colloquium, Penn State University, September 7, 2005
- ‘Normal and Starburst Galaxies in Deep X-ray Surveys’, invited talk, Populations of High Energy Sources in Galaxies meeting, International Astronomical Union (IAU) meeting 230, Dublin, Ireland, August 2005
- ‘Studying Dark Energy, Black Holes and Cosmic Feedback at X-ray Wavelengths: NASA’s Constellation-X Mission’, invited talk, Nearly Normal Galaxies in a Lambda-CDM Universe, Santa Cruz, CA., August 2005
- ‘X-ray observations of the early Universe after Chandra, XMM-Newton, and Astro-E2’, invited talk, 1st Arizona/Heidelberg Symposium: The High Redshift Frontier, Tucson, AZ, December 2004
- ‘New Frontiers Opened by Chandra in Cosmological Studies of Galaxies’, poster presentation, Starbursts From 30 Doradus to Lyman Break Galaxies, Institute of Astronomy, Cambridge, UK. September 2004
- ‘X-ray Probes of Star Formation Outside the Local Universe’, Center for Astrophysical Sciences Research Seminar, JHU, Baltimore, MD, December 9, 2003
- ‘Ultradeep Imaging Observations with the Chandra X-ray Observatory’, Invited Talk, Four Years of Chandra Observations: A Tribute to Riccardo Giacconi, conference in Huntsville, AL, 16–18 September 2003.
- ‘The Challenge to Large Optical Telescopes from X-ray Astronomy’, invited review for “Discoveries and Research Prospects from 6–10m Class Telescopes II”, SPIE (The International Society for Optical Engineering) conference in Waikoloa, Hawaii. August 2002.

- NASA Space Science Update on the Chandra Deep Fields, One of four panelist speakers, represented Penn State group's research, March 2001, aired on NASA TV, resulted in articles in the Washington Post, on CNN.com, and other news services
- 'The ACIS Particle Background: Implications for Deep Chandra Imaging.' First author on poster with Niel Brandt, Gordon Garmire, and Don Schneider. In proceedings of the Large Scale Structure in the X-ray Universe conference. Santorini, Greece. September, 1999.

## Students and Postdocs Supervised

For more details on the work of the research group, please visit [xraydeep.org](http://xraydeep.org)

### POSTDOCS:

- Neven Vulic (UMCP/GSFC, 2016-Present)
- Daniel Wik (JHU/GSFC, 2013-2017)
- Mihoko Yukita (JHU/GSFC, June 2013-Present)
- Antara Basu-Zych (NASA NPP, 2009-Present)
- Panayiotis Tzanavaris (JHU/GSFC Postdoc, 2007-Present)
- Bret Lehmer (Einstein Fellow, JHU/GSFC, 2009-2015)
- Leigh Jenkins (NASA NPP, 2004 - 2008, JHU/GSFC Postdoc, 2008-2011)
- Barb Mattson (short-term GSFC postdoc, 2008-2009)
- Gerardo Vazquez (short-term JHU/GSFC postdoc, 6 months in 2007)

### STUDENTS/INTERNS:

- David Espinoza (graduate student), 2016 – Present
- Mackenzie Jones, NASA Jenkins graduate fellow (NASA contact), 2016-Present
- Charlotte Olsen, undergraduate intern (co-advised with Basu-Zych), summer 2016
- Violet Replicon, undergraduate intern, summer 2015
- David Coulter, undergraduate intern, summer 2015
- Joshua Tyler, (graduate student), 2014 – 2015
- Greg Hrinda, Pikesville High School (physics teacher), summer 2013
- Matthew Berkeley, International Space University intern, Strasbourg, summer 2013
- Johanna-Laina Fischer, Florida Institute of Technology, spring & summer 2013
- Adrian Lucy, University of Wyoming, summer 2012
- Kumiko Morihana, NASA Academy graduate student, co-sponsored by JAXA, summer 2010
- Derek Hammer, Johns Hopkins University, thesis advisor 2005-2012, graduated 2012
- Kalman Khniznik, University of Maryland, sophomore undergraduate (summer 2008 - present)
- Svetlana Shkyolar, University of South Dakota, senior undergraduate, summer 2009
- Ashley Campbell, University of Alabama, senior undergraduate, summer 2009
- John Sheets, Roosevelt High School science & math program, senior in high school (August 2006 - August 2007, summer 2008, summer 2009)
- Erin Hudson, Rose Hulman Institute of Technology, Terre Haute, IN, junior undergraduate, NASA USRP Student (Fall 2006 & Summer 2007)
- Kalin Kanov, University of Virginia, senior undergraduate (Summer 2006)
- Ilana Spar, George Washington University, sophomore undergraduate (Summer 2006)

## Service

- Co-organizer Women in Astronomy lunches, 2012-2014
- Astrophysics Division colloquium committee, 2011-2012
- Organizing Astrophysics Division welcome coffees for new employees, 2010-2012
- Co-chair, Code 662 Civil Servant Hiring Committee Spring-Summer 2009
- Chair, Goddard Deputy Director's Council on Science, January 2009 - January 2010
- Member, Science Directorate Women's Forum, 2008-2009
- Vice-Chair, Goddard Deputy Director's Council on Science, January 2007 - 2008
- co-organizer with Randall Smith of Astro-E2/Suzaku journal club series during summer and fall 2005 (two separate sessions)
- co-organizer with Randall Smith of Tuesday science coffee in building 2 (Feb 2006-present)
- GSFC Scientific Colloquium committee (12-person committee representing the three science divisions at NASA Goddard), 2006-present
- co-organizer with Duilia de Mello (NASA GSFC/JHU) of two one-day GSFC extragalactic astronomy symposium 'EXCON1' (2006) and 'EXCON2' (2007), 80-100 attendees
- participant in GSFC-wide Diversity Dialogues project, Fall 2006

## Leadership/Management Training

- Power and Privilege: Race, NASA GSFC Training Program, September 21-22, 2016
- Women in Aerospace Senior Leaders Budget Discussion, February 25, 2016
- NASA GSFC Project Scientist training, November 14-16 2011, Greenbelt, MD
- Communication and Congress, JHU Advanced Academic Programs, Fall 2009, graduate course, Washington D.C.
- Leading Through the Influence, January 28 - February 1, 2008, NASA Wallops, Virginia
- NASA Goddard Leadership/GLES 39, Fall 2007
- From Specialist to Strategist: Business Excellence for Women in Science, Technology and Engineering, Smith College Executive Education, June 2006

## NASA Mission Involvement

- 2016 – Present, Science Co-I, Athena Wide Field Imager (WFI) instrument
- 2015 – 2017, Co-chair, Athena Science Working Group (SWG) Panel, Star Formation and its Evolution
- 2009 – Present, Astro-H SWG, Galaxies and Interstellar Medium (GISM) panel
- 2008 – Present, NuSTAR Science Working Group
  - Starburst and Local Group Galaxies Science Working Group Chair
  - Attended team meetings: (March 2008, Los Angeles; February 2009, Caltech; December 2009, Caltech; July 2011, Caltech; March 2013, Caltech; January 2014, Columbia U.; November 2016, Caltech)

- Co-Chair, X-ray Probe Science and Technology Definition Team, Sep 2013 – Dec 2013 (see [pcos.gsfc.nasa.gov](http://pcos.gsfc.nasa.gov) “Studies” for more details)
- Chandra Users’ Committee, 2009 - 2011

## Physics of the Cosmos Chief Scientist activities

The general duties of the Chief Scientist are as follows:

- Develop the PCOS science case and monitor progress towards achieving science objectives.
- Provide science input and advice to Program Manager for PCOS Program implementation:
  - Program Budgets, Program Reviews, Project Reviews
  - SR&T investments, Technology Management Plan and Technology Reports
  - Mission concept studies
- Coordinate science activities with PCOS Program Scientist at HQ
- Serve as mission scientist or study scientist as needed.
- Interface with the PCOS Science Community:
  - Project Scientists and Study Scientists
  - PhysPAG as ex-officio member of Executive Committee
  - PhysPAG SAGs as liaison
  - PCOS Website and Newsletter
- Oversee and coordinate Program outreach activities:
  - PCOS Program Education and Public Outreach
  - Advocacy within the Scientific Community

Recent, major PCOS Activities organized by Ann Hornschemeier:

- NASA L3 study for a future gravitational wave astrophysics observatory in space, serving as L3 study executive secretary ([pcos.gsfc.nasa.gov/studies/L3](http://pcos.gsfc.nasa.gov/studies/L3))
- Ex-officio member of X-ray Surveyor Flagship Mission Science and Technology Definition Team (STDT)
- Participated in HQ “Decadal Surveys Management Team” for four NASA flagship mission studies
- January 2017 APS meeting, Washington, D.C.:
  - ‘PCOS Mini-Symposium’, Chief organizer/chair
  - NASA PCOS display table in main hall with ESA’s LISA Pathfinder spacecraft model
  - GWSIG, GammaSIG, and CosmicSIG sessions
- January 2017 AAS meeting, Grapevine, TX
  - NASA PCOS display table in main hall with ESA’s LISA Pathfinder spacecraft model
  - XRSIG session
- April 2016 APS meeting, Salt Lake, City, UT:
  - ‘PCOS Mini-Symposium’, Invited speaker, chief organizer
  - NASA PCOS display table in main hall
  - GWSIG, IPSIG and CosmicSIG sessions
- April 2016 HEAD meeting, Naples, FL:
  - ‘PCOS Town Hall’, chief organizer
  - NASA PCOS display table in main hall
  - XRSIG and GammaSIG sessions

- Jan 2016 AAS meeting, Kissimmee, FL:
  - PhysPAG meeting plus multiple SIG sessions
  - NASA PCOS display table in main hall
- April 2015 APS meeting, Baltimore, MD:
  - ‘PCOS Mini-Symposium’, April 2015 APS meeting, Baltimore, MD (chair, chief organizer)
  - NASA PCOS display table in main hall
  - GWSIG and CosmicSIG sessions
- PhysPAG meeting and SIG sessions, January 2015 AAS meeting, Seattle, WA
- October 2014 Einstein Fellows’ Meeting, Cambridge, MA (chaired session)
- August 2014 HEAD meeting, Chicago, IL:
  - PCOS Town Hall, (chair, also gave a talk, chief organizer)
  - NASA PCOS display table in main hall
  - Chaired ‘Gravitational Waves from Space’ session
- ‘PCOS Mini-Symposium: High Energy Astrophysics and Cosmology from Space’, April 2014 APS meeting, Savannah, GA (chief organizer/also gave invited talk)
- ‘PCOS/PhysPAG Town Hall’, April 2013 APS meeting, Denver, CO (chief organizer/presenter)
- ‘PCOS/PhysPAG Town Hall’, April 2013 HEAD meeting, Monterey, CA (chief organizer/presenter)
- ‘PCOS Town Hall’, January 2013 AAS Meeting, Long Beach, CA (chief organizer)
- ‘PhysPAG Splinter Meeting’, January 2013 AAS Meeting, Long Beach, CA (chief organizer)
- ‘PhysPAG Meeting’, August 2012, Washington, D.C. (chief organizer, on LOC and SOC, stayed on site and made presentations, 250 participants at dedicated PhysPAG meeting)

#### PCOS Presentations by Ann Hornschemeier:

- ‘ESA/NASA L3 Study and Gravitational Wave Science at NASA’, presented on behalf of Ira Thorpe, L3Study Scientist, Physics of the Cosmos Program Analysis Group (PhysPAG) Meeting, January 3, 2017
- ‘PCOS Mini-Symposium: High Energy Astrophysics and Cosmology from Space’, April 2016 APS meeting, Salt Lake City, UT (chief organizer/also gave invited talk)
- ‘High Energy Astrophysics and Cosmology Technology Investment across NASA Astrophysics, Chicago, IL, invited talk at Special High Energy Astrophysics Division meeting, July 2015
- ‘High Energy Astrophysics and Cosmology from Space’, presentation to the American Physical Society, PCOS Mini-Symposium sponsored by APS Division of Astrophysics, Savannah, GA, April 6, 2014
- ‘The PhysPAG, PCOS in the Astrophysics Implementation Plan, and FY13 Activities in the PCOS Program Office’, presentation to the American Physical Society, session co-sponsored by APS Division of Astrophysics, Denver, CO, April 16, 2013
- ‘FY13 Activities in the PCOS Program Office and the PhysPAG’, presentation to the AAS High Energy Astrophysics Division, Monterey, CA, April 9, 2013
- ‘The Physics of the Cosmos Program and the Physics of the Cosmos Study Analysis Group’, presentation to the American Physical Society’s Division of Astrophysics, Atlanta, GA, April 2, 2012
- ‘The Physics of the Cosmos Program and the Physics of the Cosmos Study Analysis Group’, presentation to science and technology management at NASA Marshall Space Flight Center, March 30, 2012

# Teaching and Outreach Experience

**Note: The Big Explosions and Strong Gravity activity founded by Hornschemeier, mentioned below, has continued as a national program under the PCOS EPO program, but due to the 2013 re-direction of NASA EPO funding, its future is uncertain past 2015.**

## Longer-term Activities

Education liaison for NASA GSFC Astrophysics Science Division on higher education (undergraduates and graduate students, 2008-2010 (included coordination of first grad school panel discussion during summer 2009 at GSFC)

Advisor, Girl Scout Astronomical Cosmic Exploration (ACE) of Space club, “club” for girls age 11-17 to explore their interests in space, 2004-2009

## Chronological Listing of Experience

2017 March, ‘Scale of the Solar System’ activity for first and second graders, Friends Community School, College Park, MD

2017 March, Reviewer for NASA ASTAR fellowships for underrepresented minorities in STEM

2015 June, Reviewer for NASA ASTAR fellowships for underrepresented minorities in STEM

2014 April 11, Participated in MESA (Mathematics, Engineering, Science, & Achievement) club meet and greet with scientists and engineers at Pikesville High School (advisors: Mr. Greg Hrinda and Ms. Claudia Hess)

2013 Summer, Worked with high school physics teacher, Mr. Greg Hrinda, of Pikesville High School, over the summer on a research and education project through the Towson BEST program

2010 April 10, Co-coordinator for Big Explosions and Strong Gravity patch day at Johns Hopkins University with  $\approx 100$  girls in attendance

2009 March 26th - ACE of Space (Girl Scout club for ) kick-off at NASA GSFC

2009 March 14th, Volunteer at Girl Scout ‘Women in Aviation Day’ at Udvar-Hazy National Air & Space Museum, one-person booth teaching about the abundance of elements in the Universe

2008 April 26, Co-coordinator of fourth Big Explosions, Strong Gravity Girl Scout patch day (Camp Ilchester, Howard County, MD,  $\sim 70$  attendees and  $\sim 15$  scientist volunteers)

2008 April 24, Interview by Yosi Gelfand aired on weekly Astronomy radio show on Vassar College Radio in Poughkeepsie, NY, (<http://astroshow.blogspot.com/search?q=Hornschemeier> )

2008 February 28-29, Assisted with ‘Afterschool Universe’ training for Girl Scouts of Central Maryland council

2007 December 4, Hosted Mr. Matthew Fanny’s Fairfax High School science class for NASA Goddard Space Flight Center tour & lecture ( $\sim 20$  students)

2007 October 19, Panel member and presenter, University of Maryland College of Computer, Mathematical and Physical Sciences Advanced Graduate Student Workshop: Finding Your First Job, topic was ‘Finding a Government Job’

2007 August 9, Instructor for X-ray Astronomy School on ‘Surveys’, George Washington University

2007 June 27-28, Presentation on ‘Rainbow Analysis and the Invisible Universe’ at the 6th Workshop on “Topics in Modern Astronomy”, June 27-28, 2007, Norfolk State University, Norfolk, Virginia (with Dr. Ed Wollack, GSFC)

see <http://bigexplosions.gsfc.nasa.gov> for more information

2006 May 19: Organized brown bag lunch with NASA scientists/engineers for Garrison Forest School’s WISE program students, included 9 scientists from all three science divisions at Goddard

2005 September - Present: Advisor, Girl Scout “ACE of Space Club” for girls interested in space science, regular monthly meeting (most held at Goddard visitor center)

2005 September : Held a booth at the Girl Scout “Big Event” in Howard County (1000 girls visited

during approximately four hours, Dr. Hornschemeier was the only person at the booth!)

2005 June: Second Big Explosions, Strong Gravity Girl Scout patch day (JHU, 80 attendees)

2004 July: First Big Explosions, Strong Gravity Girl Scout patch day (JHU, 60 attendees)

2003 Fall: Six classroom visits (one day) to inner-city D.C. schools, Challenger Center's "Journey through the Universe", presentations on production of elements and supernovae

2002 Fall: Three visits to Girl Scout Baltimore inner-city center, Project Astro scale of the Universe

1999–2002: Lecturer for Summer Penn State In-service Workshops in Astronomy (H.S. teachers)

1999–2002: PSU Astronomy AstroFest volunteer (event coordinator in 2000 & 2001)

1999–2001: Take Our Daughters to Work Day coordinator, PSU Astronomy

1999–2002: Substitute lecturer for Astro 001, 010, and 197A, PSU

1997–2002: Outreach for K-12 (including Planetarium shows, slide shows, etc.), PSU

1998 Spring: Astronomy 011 Instructor, PSU

1997: Substitute Teacher for A.P. Calculus (AB & BC), Des Moines Public Schools

1996–1997: Supplemental Instructor, Calculus III, Drake University

### Invited Outreach Events

- 'All the X-ray binaries in the Universe: X-ray Emission from Normal and Starburst Galaxies Near and Far', Helen Sawyer Hogg Lecture public lecture, Royal Astronomical Society meeting, London, Ontario, May 21, 2016
- 2015 September 25, A balancing act: career, family and hobbies", Montgomery College career and science talk.
- 2010 January 15-17, Invited Presenter at Southeast Conference for Undergraduate Women in Physics (SCUWP), Duke University, spoke on 'X-rays from galaxies teeming with black holes and neutron stars' and on the career path for a NASA astrophysicist
- Keynote speaker at Girl Scout Gold Award banquet, Michaels Eighth Ave, Glen Burnie, MD, May 18th, 2008
- 'Life After Drake', invited guest lecture at Drake University, Des Moines, IA (March 2007), but note that blizzard prevented the lecture from taking place as planned
- Invited keynote address at the "Women in Science" symposium held by the Wyoming Space Grant consortium, Laramie, Wyoming, May 2006
- Invited talk on "Perspectives on doing outreach as an active research scientist" for the Professional Astronomers and Small NASA EPO Grants American Astronomical Society meeting session. This workshop was hosted by the NASA Scientists in Education Working Group (SCIWG).
- 'X-raying the Universe with Chandra', Invited luncheon speaker, Summer Science Academy for girls, Shippensburg University, (directed by Prof. Kay Williams) June 2002
- Mock NASA press release for English 416 class (Instructor: Cynthia Berger), January 2002

### Grants for Education and Public Outreach

- *Chandra* Cycle 8, \$25K, for ACE of Space
- NASA ROSES ADP supplement, 2007, \$140K, 'Big Explosions and Strong Gravity'
- *Chandra* Cycle 6, \$8.1K, "Building Interest in Science Among Middle School Age Girls using Big Explosions and Strong Gravity", partner with Girl Scouts of Central Maryland
- *Chandra* Cycle 5, \$9.4K, "Supernova and Black Hole Patch Activity: Involving Middle School Girls in Science", partner with Girl Scouts of Central Maryland

### Educational Professional Development

- Space Science Institute's "Education Workshop for Scientists, Engineers, and EPO Managers", April 2002, Boulder, CO